

February 4, 2009

**TECHNICAL SUPPORT DOCUMENT FOR FOOD
PROCESSING FACILITIES: PROPOSED RULE
FOR MANDATORY REPORTING OF
GREENHOUSE GASES**

Climate Change Division
Office of Atmospheric Programs
U.S. Environmental Protection Agency

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1. Industry Description

Food processing facilities prepare raw ingredients for consumption by animals or humans. Many facilities in the meat and poultry, and fruit, vegetable, and juice processing industries have on-site wastewater treatment. This can include the use of anaerobic and aerobic lagoons, screening, fat traps and dissolved air flotation. These facilities can also include onsite landfills for waste disposal. There are approximately 5,720 food processing facilities in the United States.

The sources of GHG emissions at food processing facilities considered in the analysis for the proposed rule are stationary combustion, onsite landfills and onsite wastewater treatment.

Data is unavailable on stationary combustion at food processing facilities, but it is believed that some of these facilities may have stationary combustion systems with significant GHG emissions.

2. Total Emissions

In 2006, CH₄ emissions from wastewater treatment at food processing facilities were 3.7 MMTCO₂e, and CH₄ emissions from onsite landfills were 7.2 MMTCO₂e.

Estimates of total national emissions stationary combustion at food processing facilities are unavailable.

3. Review of Existing Programs and Methodologies

For information on the review of existing programs and methodologies, please refer to the Technical Support Documents for general stationary fuel combustion (EPA-HQ-OAR-2008-004), landfills (EPA-HQ-OAR-2008-034), and wastewater treatment (EPA-HQ-OAR-2008-035).

4. Types of Emissions Information to be Reported

For information on information to be reported, please refer to the Technical Support Documents for general stationary fuel combustion (EPA-HQ-OAR-2008-004), landfills (EPA-HQ-OAR-2008-034), and wastewater treatment (EPA-HQ-OAR-2008-035).

5. Options for Reporting Threshold

5.1 Emissions-based thresholds for Wastewater

In evaluating thresholds for food processing facilities, we first considered emissions-based thresholds of CH₄ generation at onsite wastewater treatment system (“generation threshold”) and CH₄ emissions at wastewater treatment systems (“emissions threshold”) of 1,000 mtCO₂e, 10,000 mtCO₂e, 25,000 mtCO₂e, and 100,000 mtCO₂e per year. Data

on emissions from stationary combustion sources at food processing facilities were unavailable to conduct similar analyses for these sources. The “generation threshold” is the amount of CH₄ that would be emitted from the facility if no CH₄ recovery takes place. This includes all CH₄ generation from all wastewater treatment system types, including digesters. The “emissions threshold” includes the CH₄ that is emitted to the atmosphere from these systems. In the emissions threshold, CH₄ that is recovered and combusted at digesters is taken into account and deducted from the total CH₄ generation calculated. Please see the Technical Support Document for Wastewater (EPA-HQ-OAR-2008-035) for more information.

Table 1. Summary of Threshold Analysis for Industrial Wastewater Treatment at Food Processing Facilities

Threshold (mtCO ₂ e)*	# Systems	% Systems	Emissions (mtCO ₂ e)	% Emissions
Meat Processing –Emissions				
1,000	<616	<18	<2,024,125	<100
10,000	<45	<1.3	<1,125,000	<56
25,000	<13	<0.4	>325,000	>16
100,000	1	<0.1	>100,000	>5
Meat Processing – Generation				
1,000	<616	<18	<2,024,125	<100
10,000	<45	<1.3	~1,125,000	>56
25,000	<19	<0.6	>425,000	>23
100,000	2	<0.1	>200,000	>10
Poultry Processing – Generation and Emissions				
1,000	86	16	>1,286,000	>85
10,000	50	9.3	>1,250,000	>82
25,000	NE	NE	NE	NE
100,000	0	0	0	0
Fruit and Vegetable – Generation and Emissions				
1,000	<100	<6%	<123,000	<100
10,000	0	0	0	0
25,000	0	0	0	0
100,000	0	0	0	0

* Threshold analyzed is based on wastewater treatment emissions only.

5.1.1 Meat and Poultry Processing Analysis for Wastewater Treatment Threshold

EPA was unable to obtain a dataset containing plant-specific information to calculate greenhouse gas emissions for meat processors or poultry processors. Therefore, using national default values for wastewater generation, COD in wastewater rates, and assuming all wastewater is treated anaerobically on site, EPA back-calculated the production rate that would trigger each of the four emission thresholds.

Table 2. Summary of Minimum Amount of Product Processed to Meet Thresholds for Wastewater Treatment at Food Processing Facilities

Threshold (mtCO ₂ e)	Meat Processing Production		Poultry Processing Production	
	Thousand metric tons	Million lbs	Thousand metric tons	Million lbs
1,000	5	12	4	9
10,000	53	117	42	93
25,000	133	292	105	232
100,000	531	1,170	421	928

EPA's Office of Water (OW) established national effluent limitation guidelines and standards for this industry in 2004. At that time, OW estimated that nonsmall poultry processors processed over 100 million pounds of meat per year. This is very close to the estimated production cutoff for facilities to meet the 10,000 mtCO₂e threshold. OW estimated that there were 206 nonsmall poultry processors (EPA 2004), and that 25% of poultry processors have onsite anaerobic lagoons. Therefore, EPA estimates that approximately 50 poultry processors would exceed the 10,000 mtCO₂e threshold. If we assume the average production for these large poultry processors is about 200 million pounds, these 50 plants account for about 70% of the greenhouse gas emissions for this sector. Because of a lack of data, we assumed that no poultry processors collect biogas for recovery. Therefore, we believe this is a conservatively high estimate.

EPA estimated that there are 145 small poultry processors. Assuming 25% have onsite anaerobic lagoons, EPA estimates that no more than 36 poultry processors could exceed the 1,000 mtCO₂e threshold. EPA assumed emissions from these operations are at least 36,000 mtCO₂e.

Data are not available to estimate the number of poultry processors that exceed the production level for the 25,000 mtCO₂e threshold; however, EPA believes there are no plants that meet the production level for the 100,000 mtCO₂e threshold. Because of the assumption that no poultry processors collect biogas, generation is equal to emissions.

EPA also estimated that there were 139 nonsmall meat processors that processed >50 million pounds per year. Of these, EPA estimates that 33% have onsite anaerobic treatment. Therefore, EPA estimates that no more than 45 meat processors would exceed the 10,000 mtCO₂e threshold. If we assume the average production for these large meat processors is about 350 million pounds, these 45 meat processors account for about 67% of the greenhouse gas emissions for this sector. We believe this is a conservatively high estimate.

EPA estimated that there are 1,730 small meat processors. Assuming 33% have onsite anaerobic lagoons, EPA estimates that no more than 571 meat processors could exceed the 1,000 tCO₂e threshold. EPA assumed emissions from these operations are at least 571,000 tCO₂e.

These estimates also assume that no meat processing facilities collect biogas for recovery. However, data available on one food processor's web site indicates that covers have been installed on anaerobic lagoons at five meat processing plants (4 beef, 1 pork). Prior to the installation of the covers, all five sites were estimated to emit more than 25,000 mtCO₂e and one of these sites emitted more than 100,000 mtCO₂e. Following installation of the covers, only one of these sites emits more than 25,000 mtCO₂e and three more emit more than 10,000 mtCO₂e.

Data from another food processor's web site indicates that the processor has installed covers on all of its anaerobic lagoons at U.S. meat packing plants (8 beef, 2 pork). It is estimated that these plants would have emitted more than 25,000 tCO₂e each. It is unknown what their actual emissions are now.

From these data, then, we estimate that no more than 13 meat processing facilities emit more than 25,000 mtCO₂e and one of these plants may emit more than 100,000 mtCO₂e, and no more than 19 plants generate more than 25,000 mtCO₂e and two of these plants may generate more than 100,000 mtCO₂e.

5.1.2 Fruits and Vegetables Processing Analysis for Wastewater Treatment Threshold

Because of the decentralized and variable nature and of the fruits and vegetables processing industry, EPA was unable to obtain a dataset containing plant-specific information to calculate greenhouse gas emissions for fruit and vegetable processors. The national level of emissions from the U.S. inventory is 123,000 mtCO₂e. From the U.S. Inventory, we estimate there are approximately 100 processors with onsite anaerobic treatment; therefore, the average emission is about 1,200 mtCO₂e per plant. Therefore, it is not believed that there are many, if any, fruit and vegetable processors that would exceed thresholds greater than 10,000 mtCO₂e. However, up to 100 processors may exceed the 1,000 mtCO₂e threshold based on the average emission rate.

5.2 Emissions-Based Thresholds for Onsite Landfills

The number of food processing facilities having onsite industrial landfills was estimated based on a 1987 screening survey of industrial Subtitle D waste management practices. Methane generation and emissions were estimated based on U.S. GHG Inventory estimates. The number of landfills and percentage of waste covered by each threshold was estimated based on expert judgment and the average methane emissions potential for the industrial landfills. Food processing landfills were assumed not to have recovery, so there is no difference in the number of landfills covered or the emissions covered under generation versus emissions thresholds.

Table 3. Threshold Analysis for Landfills at Food Processing Facilities

Threshold (mtCO ₂ e)*	# Landfills	% Landfills	Emissions (mtCO ₂ e)	% Emissions
Food Processing –Generation and Emissions				
1,000	189	100	7,200,000	100
10,000	170	90	7,000,000	97
25,000	100	53	5,000,000	69
100,000	10	5	1,500,000	21

* Threshold analyzed is based on landfill emissions only.

5.3 Other threshold options

EPA also considered a facility-level threshold for food processing. Data were unavailable to estimate emissions from stationary combustion at food processing plants, or to estimate the number of food processing plants having both wastewater treatment systems and landfills onsite. The table below presents estimates of facility coverage based on maximum values for number of facilities covered using thresholds for onsite wastewater treatment systems or landfills.

Table 4. Threshold Analysis for Food Processing Facilities

Threshold Level	National Emissions mtCO ₂ e	Total Number of Facilities	Emissions Covered		Facilities Covered	
			mtCO ₂ e/ year	Percent	Number	Percent
1,000 mtCO ₂ e	NE	5,719	NE	NE	802	14.0
10,000 mtCO ₂ e	NE	5,719	NE	NE	170	3.0
25,000 mtCO ₂ e	NE	5,719	NE	NE	100	1.7
100,000 mtCO ₂ e	NE	5,719	NE	NE	10	0.2

NE = Not Estimated

6. Options for Monitoring Methods

For information on monitoring methods, please refer to the Technical Support Documents for general stationary fuel combustion (EPA-HQ-OAR-2008-004), landfills (EPA-HQ-OAR-2008-034), and wastewater treatment (EPA-HQ-OAR-2008-035).

7. Options for Estimating Missing Data

For information on options for estimating missing data, please refer to the Technical Support Documents for general stationary fuel combustion (EPA-HQ-OAR-2008-004), landfills (EPA-HQ-OAR-2008-034), and wastewater treatment (EPA-HQ-OAR-2008-035).

8. QA/QC Requirements

For information on options for QA/QC requirements, please refer to the Technical Support Documents for general stationary fuel combustion, (EPA-HQ-OAR-2008-004), landfills (EPA-HQ-OAR-2008-034), and wastewater treatment (EPA-HQ-OAR-2008-035).

9. References

EPA. 2008. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2006 (April 2008) USEPA #430-R-08-005.

EPA. 2004. Technical Development Document for the Final Effluent Limitations Guidelines and Standards for the Meat and Poultry Products Point Source Category (EPA-821-R-04-011). Office of Water. Washington DC.

IPCC. 2006. IPCC Guidelines for National Greenhouse Gas Inventories: Wastewater Treatment and Discharge. IPCC (Volume 5 Waste, Chapter 6). Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_6_Ch6_Wastewater.pdf.

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